PROBLEMS.

54. Proposed by E. W. MORRELL, Department of Mathematics, Montpelier Seminary, Montpelier, Vermont.

Transform $x^4+y^4+z^4-2y^2z^2-2z^2x^2-2x^2y^2-$ into a product.

[*Bowser's Trigonometry.*]

55. Proposed by MARCUS BAKER, M. A., U. S. Geological Survey, Washington, D. C.

Two right triangles ABC and ABD are so placed as to have one side $x(=AB)$ in common. From P the intersection of their hypotenuses is drawn c perpendicular to x. Knowing the hypotenuses $a=39$ feet and $b=25$ feet and the perpendicular $c=12\frac{4}{7}$ feet, find x. Note this theorem $\frac{1}{m}+\frac{1}{n}=\frac{1}{c}$ or $\frac{1}{\sqrt{a^2-x^2}}+\frac{1}{\sqrt{b^2-x^2}}=\frac{1}{c}$, where m and n are the altitudes of the two triangles, respectively. Also find locus of P. Discuss the case when the triangles are general (not right angled.)

[The same problem, in the form of "two poles" with ropes stretched from top of one to foot of other and the same data given, was contributed by H. C. Wilkes. Ed.]

GEOMETRY.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

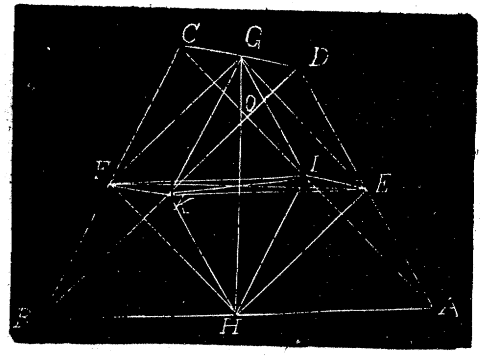
SOLUTIONS OF PROBLEMS.

43. Proposed by J. F. W. SCHEFFER, Hagerstown, Maryland.

The consecutive sides of a quadrilateral are a, b, c, d. Supposing its diagonals to be equal, find them and also the area of the quadrilateral.

Solution by G. B. M ZERR, A. M., Ph. D., Professor of Mathematics, Inter State College, Texarkana, Texas.

Let $AB=a$, $BC=b$, $CD=c$, $DA=d$, $AC=DB=x$, $EF=y$, $GH=z$; also, let H, F, G, E, I, K be the middle points of AB, BC, CD, DA, AC, DB, respectively.



Then $EGFH$, $GKHI$, $FKEI$ are all parallelograms; but $IG=HK=\frac{1}{2}d$, $HI=KG=\frac{1}{2}b$, $EI=KF=\frac{1}{2}c$, $FI=EK=\frac{1}{2}a$, $EG=GF=FH=HE=\frac{1}{2}x$.

$\therefore \frac{1}{4}(a^2+c^2)=y^2+$